

PATENT SPECIFICATION



Application Date: Feb. 13, 1943. No. 2394/43.

" " March 11, 1943. No. 3935/43.

570,866

One Complete Specification left (under Section 16 of the Patents and Designs Acts, 1907 to 1942): Aug. 16, 1943.

Specification Accepted: July 26, 1945.

PROVISIONAL SPECIFICATION

No. 2394 A.D. 1943.

Improvements relating to the Treatment of Animal and Vegetable Materials

I, CHARLES REID, a British subject, of 3, Rose Garden Close, Canons Drive, Edgware, Middlesex, do hereby declare the nature of this invention to be as follows:—

This invention relates to improvements in the treatment of materials (solid and liquid) of animal and vegetable origin by submitting them during an extraction process to the influence of an electric field, in such a way as to improve or increase their latent energy when extracted. The invention includes the treatment of materials so as to improve their powers of reaction chemically with other materials; the treatment of materials to prevent or retard bacterial and other decompositions within themselves; the treatment of materials to improve their resistance to cohesion; and treatments for other purposes in which the results are dependent upon the latent energy of the materials in question.

The invention is based upon the hypothesis that the atom can and does function as a condenser; that is, that the atom can be made to receive a charge of energy and to give up that charge, the received charge being either an addition to the normal or natural charge, or being a replacement in whole or in part of a normal charge previously given up, or both. This may be regarded as the principle of the invention. It is recognised, of course, that the conceptions of atoms as having nuclear and orbital constituents is an arbitrary attempt to visualise the current atomic theories not capable of direct demonstration by observation and/or experiment, and that the phenomena of receiving and giving up a charge of energy may be due to the gain and loss of orbital electrons in the atom, or to the displacement of electrons from one energy level or orbit to another, or may be due to some other sub-atomic disturbance not yet fully understood. I have found, however, as a matter of observable fact, that my invention does have the effect of increasing

and prolonging the energy-content of the animal and vegetable materials treated thereby.

Contrariwise, this invention is found not to have effect on materials (including organic materials) not having a living (i.e. animal or vegetable) source, and I have formed the belief that the capacity of the atoms of animal and vegetable materials to receive and give up a charge of energy is associated with what is popularly referred to as "life force." Certain it is, that materials coming from a healthy life source have greater latent energy for reaction etc., than those of the same kind coming from unhealthy life sources, and that my invention is capable of improving those materials from unhealthy sources so that their energy index is at least on a par with that of the materials from healthy sources.

The industrial applications of the invention will fall into two main groups, in one of which the treated materials have their greater atomic energy used for merely physical purposes, such as in preventing the coagulation of sediment in boilers, or in facilitating the separation of materials in extraction processes; and in the other of which the treated materials have their greater atomic energy used to promote, or prolong, or accelerate chemical reaction. In a subsidiary group, applications of the invention to the manufacture of medicines, foods and beverages will be found, the products from which may owe their effect to the living organism to both physical and chemical responses to them when in the organism.

In the first of the said main groups, the invention, as is hereinafter set out more fully, may be applied *inter alia* to the preparation of a vegetable extract already known as a retarder of scale-formation in boilers and the like, not only with the object of improving the extraction process in the manufacture of the preparation, but of maintaining the activating effect of the extract when in

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the boiler water etc., and thus increasing the anti-scale effect. In the second group, the invention may be applied to industrial chemical processes which hitherto, in some instances, appear to be frustrated or blocked for apparently unascertainable reasons. I have now deduced that such frustration is due to a premature expenditure of atomic or molecular energy in the materials being reacted, and that the application of my invention by increasing or replacing that energy allows the partially-complete reactions to continue. Again, my invention may be applied with good effect to some natural chemical processes, by intensifying and/or accelerating those processes.

The present invention is involved in the preparation and uses of extracts from vegetable and animal sources, and comprises any method of preparation of those extracts which includes, in the order stated, the steps of washing the original materials, bruising them (the term "bruising" including crushing, grinding and disintegration), subjecting them to an extraction process, and, during the extraction process, subjecting the materials to the influence of an electric or electro-magnetic field produced in an apparatus designed as a condenser and defined as follows. The field is to be one generated directly or indirectly by a non-continuous current, i.e. an alternating current, with or without rectification, or a pulsating direct current and is to be of a strength such as is found by experiment in each particular case not to produce, during the period of treatment, acidity in the extracted materials, or, if natural acidity is already present, not to increase acidity. the presence or absence of acidity in each case being gauged by the pH test.

The souring, putrefaction and decay of animal and vegetable materials is invariably accompanied by the formation of acids. The chemical reactions involved in such phenomena as souring, putrefaction and decay are due to natural tendencies to attain an equilibrium between the energy potentials of the several reagents concerned, and the progress toward such equilibrium may be gauged by the degree to which acidity, or increased acidity as denoted by the pH value is present. The phenomenon is accompanied by an increase of insoluble content and a decrease in the Brownian movement. If the energy potentials arrive at equilibrium, or have only slight differences between them, the ability to re-act with surrounding or added substances is correspondingly lowered, not, probably because of the actual or approximate equilibrium *per se*, but because the higher potentials have been

brought down to a lower level. My invention is designed to prevent such lowering of the higher potentials, thereby maintaining, and in some cases increasing the ability of the materials to react with, or to impart energy to other substances with which they are brought into contact.

It is known that liquid substances extracted from materials of animal and vegetable origin deteriorate as time passes, some rapidly (e.g. milk) and others more slowly (e.g. fruit juices) and such deterioration, at least in its earlier stages, is denoted by a loss of piquancy of taste, of aroma, of resistance to bacterial, and of nitriment value, together with a retrogression from a solvent phase, though a colloidal phase, to actual deposit of the dispersed substance. I have ascertained that these deleterious changes can be expressed in terms of a falling in the pH value of the liquids, or increase in insoluble content, and that extracts obtained according to my invention, that is, whilst under the influence of the said field, retain their original pH value, and their original proportion of soluble content, resulting in a greater resistance to deterioration, than have extracts of the same kind not obtained according to my invention.

I have formed the conclusion that the keeping power, or lack of keeping power of vegetable and animal materials, and the power to remain in solvent or colloid form without sedimentation, is dependent upon the energy-content of the atoms in those materials, this conclusion being supported by the fact that extracts from healthy materials have greater keeping power than those from unhealthy materials. I am convinced also that the reason why extracts prepared according to my invention have the increased keeping power, as compared with extracts obtained by other means, is that by my invention the atoms are charged with additional energy.

The application of the electric or electro-magnetic field to the materials, whilst the extraction process is going on, may, for example, be according to my earlier invention disclosed in Specification No. 543,706, or may be according to any of those of the previous proposals therein referred to in which a field is produced by a non-continuous current, so long as, in any case, they do not produce, or increase acidity in the extracts.

The extracts obtained may continue to be subjected to the influence of the field immediately after their extraction from the original materials, either in the same vessel or in a separate vessel into which they may drain for that purpose.

According to a further feature of the invention, between the washing and bruising stages, the original materials may be passed through a complete or partial fermentation process, and in some cases the electrical treatment may be commenced during that process and continued uninterruptedly into the extraction process.

10 In one practical embodiment of the invention already tried out, the electrical treatment is applied to the extraction of an anti-scaling compound for boilers known by the Trade Mark "D. M." This
15 compound is an extract from vegetable materials which, when added to boiler water counteracts acidity in the water and prevents the formation of scale, the salts etc., in the water being deposited as an
20 activated sludge instead of as a non-activated incrustation. It is believed that, when the extract is first prepared, the atoms of the material have sufficient surplus latent energy to impart energy to
25 the atoms or molecules of the salts or other substances present in the water, in such a way as to set up (or, if already present to increase) repelling forces between them, thereby preventing coagulation and in-
30 crustation. When this compound is prepared by a process including my invention, the energy-content of the atoms is found to be increased, thus prolonging the useful life of the compound in the boiler,
35 as well as increasing its intensity. Naturally, the impartation of energy to the contained salts or the like in the water will, sooner or later drain the compound of its usefulness, but I have found that its use-
40 fulness may be still further increased if its depleted energy is replaced by means of my invention, by the addition to the boiler water of fresh water which itself has been subjected to one of the treat-
45 ments available for the "D. M." extract.

This invention may be further characterised in that materials obtained by an extraction process characterised as above defined, are subjected to a further and
50 similar electrical treatment whilst in use, this treatment again being limited in that it is not to produce but is to counteract harmful acidity in the extracts.

It may be stated here that a process for the direct treatment of water by subjecting it to alternating electric field has
55 previously been proposed, but it is found that the treatment ionizes any acid present in the water and increases the harmful effect of the acids on the dissolved matter
60 and on the boiler plates. On the other hand, and as distinct from such previously-proposed process, in the present invention the treated vegetable extracts
85 firstly remove the harmful acidity from

the water, turning it into harmless sugar compounds, and secondly the atomic energy lost during this change is replaced by a further supply of new energy from fresh water added to the boiler, which
70 has itself been treated by my process. In this manner, boiler water can be successfully treated by my process, which could not be successfully treated by the said previously-proposed process.

In other practical embodiments of the invention, the treatment is applied to the extraction of essences, juices and the like for use as foods, beverages, or for use as
75 medicines. In some cases, the invention can be employed merely in the manufacturing processes, whether the final products are cooked or similarly treated or not, whilst in others it will be employed also
80 during final cooking or similar preparation processes.

A certain amount of work is being done at present on the dehydration of foods, mainly for the purposes of reducing transport costs for foods, and of prolonging the
85 useful storage life of foods. Most of the methods attempted involve some kind of extraction process, but it is noticeable that the dehydrated foods, when prepared for consumption, have a certain "flatness"
90 of taste, and a loss of distinctive aroma. It is my belief that the extraction processes used call for the expenditure of energy from the atoms in the foods, and that the methods of preparation (cooking
95 etc.), far from restoring that energy, call for the giving up of further sub-atomic energy. This loss of energy is, in my opinion the cause of said "flatness," loss of piquancy, and diminished nutrient
100 value. In many cases, according to the hitherto known art, the product cannot be stored unless oxygen is extracted from the container and replaced with an inert gas such as nitrogen.

According to a still further feature of my invention, the electrical treatment is applied in an extraction process (preceded by washing and bruising) which forms a
105 part of a dehydration process. Food materials thus prepared, retain a large proportion of their original sub-atomic energy and solubility, and therefore in their final state approach more nearly in nutrient value to the natural unhydrated foods.
110 Moreover, food substances thus prepared, according to this still further feature of the invention, may be subjected to a repetition of the electrical treatment during a re-hydration or cooking process (or both)
115 when being prepared for use.

The following synopsis shows the general lines upon which the invention can be applied for dietetic, medicinal or
120 industrial purposes.

The first stage comprises the washing of the vegetable or animal materials to remove superficial contamination, which can be done in a washing plant of any suitable known form. Next, the materials are bruised, cut and shredded, for example between stainless steel rollers and cutters, or in a pulping or shredding machine such as is used in the manufacture of wood pulp, and during this bruising process the materials may be heated (e.g. steamed) to facilitate the subsequent extraction process. The washing process ensures that all non-vegetable and non-animal water is removed, whilst the bruising process results in a preliminary loosening of the inner structure of the materials, and in the exposure of a greater area to the effect of applied reagents, including atmospheric reagents.

In the third stage, which in some cases may be omitted, the bruised material is arranged in layers of say from 1" to 3" in thickness and is fermented. If, in the ultimate product, flavour and taste are to be of primary importance, the fermentation is prolonged; whereas if it is medicinal or alcoholic properties in the ultimate product which are to be of first importance, the fermentation period is shortened, or is omitted altogether.

Next, the bruised, or bruised and fermented materials, are subjected to a sterilising process, which also in some cases may be omitted, and are then passed to an extraction process in which the materials are agitated in the presence of water, with or without heating and with or without a sub-atmospheric, or super-atmospheric pressure, or alternating cycles of higher and lower pressures, and during this agitation the whole mass is passed one or more times through an apparatus similar to that described and shown in my earlier Specification No. 543,706, for the purpose of increasing the potential energy of the ultimate constituent structure of the material. The importation of the extractable material of an increased energy and/or the replacement of the energy lost in the phenomenon of separation by which the extraction goes on, results in a greater amount of extract being obtainable than would be possible without such imparted energy, and also results in that extract which is obtained being of a better quality, capable of longer storage without corruption, and of more potent reactivity than those extracts obtained without the use of my invention. It is found that with some substances of delicate structure such as grapes, mangoes and mangosteens, it is an improvement to reduce the temperature of the materials, say to 40° F. or lower during the agitation and energising process.

When the extraction process is complete, the larger particles are removed by coarse filtering or straining, and the remainder is passed to a colloid mill so that the non-liquid matter still remaining is reduced to a dispersion of colloid dimension in the liquid phase. Preferably, the filter is passed through an alternating field on its way to the colloid mill and for such purpose may pass through a second apparatus according to my Specification No. 543,706. Also the solid matter kept back by the filter or strainer will be suitably pressed so as to yield as much liquid matter as possible, which liquid matter will be added to the filtrate.

The liquid material now obtained is again subjected to an electrical energising treatment and is then passed to a concentrating and/or drying process. During concentration, which will mainly consist of the evaporation of water, the temperature should not exceed 212° F., and should preferably lie between 150 and 200° F. After concentration, and before drying (if drying is resorted to) the concentrate is subjected to the electrical treatment e.g. in an apparatus according to my earlier Specification No. 543,706. Drying may be carried out on heated drums in known manner, with or without subsequent grinding to produce a powdered product.

Alternatively, instead of the energised extract being passed to a colloid mill and then subjected to the subsequent processes referred to above, it may be converted to a powder immediately by being discharged as a fine spray into a heated atmosphere within a closed chamber.

In either case, the resulting powder may be toasted to give it an added flavour, and it may be moisture-conditioned, preferably to give it a moisture content of between 3% and 7% by weight. The powders are now stored for a period with the minimum access of oxygen, say by being kept in air-evacuated containers, or in the presence of an inert gas such as nitrogen, or by being packed close together in cylinders. During this stage and within a period of 2 or 3 months, the full natural flavour and aroma are produced through the agency of a slow part fermentation.

In a particular example carried out according to the above scheme, a juice extracted from a portion of a red cabbage was obtained, and at intervals thereafter was compared with an extract obtained by ordinary means from another portion of the same cabbage. The comparisons were made by using the B.D.H. pH indicator, which is a colour comparison, and the results may be tabulated as follows, the "treated" specimen being that prepared

according to my invention and the "untreated" being that obtained without the use of my invention:—

		pH value treated specimen.	pH value untreated specimen.
5	Test Hours.		
	0	8.5	8.5
	16	8.5	8.5
	38.5	8.5	8.5
10	62.5	8.5	8.0
	75	8.5	7.0
	86.5	8.5	6.7
	99	8.0	6.5

An example of electrical apparatus employed may be substantially according to Fig. 2 of my said prior Specification No. 43,706, using a 50 cycle, single phase A.C. at 2 volts pressure and passing 250—500 microamps. The rate of flow of the material over the plates would be $\frac{1}{2}$ gallon per minute, and the area of plate in contact with the material 75 square inches. The plates of the condenser should be arranged as stirrers and agitators in the liquid, and care taken to avoid their contacting each other, or some other method

of agitation should be adopted.

The advantages accruing from the adoption of this invention are many. In particular it may be stated that (a) transport and storage space may be reduced (25 cubic feet of cabbage treated as in the above example can be reduced to $\frac{2}{5}$ ths of a cubic foot; (b) activated protective films on the inner face of boilers etc. prolong the activity of those installations, as well as reducing running costs; (c) food products in powder form may be transported to any part of the world without risk of climatic interference, and without loss of taste, aroma and nutrient or medicinal value; and (d) the long storage life of the treated products makes possible a more practical control of economic factors such as supply and demand, as well as permitting a more efficient preparation against national shortages due to emergencies.

Dated this 9th day of February, 1943.

For the Applicant,

WILSON, GUNN & ELLIS,
Manchester, 1.

PROVISIONAL SPECIFICATION

No. 3935 A.D. 1943.

Improvements relating to the Treatment of Animal and Vegetable Materials

I, CHARLES REID, a British Subject, of 3, Rose Garden Close, Canons Drive, Edgware, Middlesex, do hereby declare the nature of this invention to be as follows:—

This invention relates to improvements in the treatments of materials (solid and liquid) of animal and vegetable origin so as to increase their latent energy and comprises improvements in or developments of the invention forming the subject of my earlier application for Patent No. 2394/43.

According to that earlier application, a method was proposed which involved the preparation of extracts of animal and vegetable materials and which included, in the order stated, the steps of washing the original materials, bruising them (the term "bruising" including crushing, grinding and disintegrating) subjecting them to an extraction process and, during the extraction process, subjecting them to the influence of an electric or electro-magnetic field produced in an apparatus designed as a condenser, and defined as follows. The field was to be one generated directly or indirectly by a non-continuous current, that is an alternating current with or without rectification, or a pulsating direct current, and was to be of a

strength such as was found by experiment in each particular case not to produce acidity nor to increase acidity in the substances present.

According to the present improvements, the field is produced by an electric force (preferably uni-directional and if so either continuous or non-continuous) which is of only such potential and density that it will supply to the materials under treatment the approximate electronic charge capable of being absorbed by the atomic structure of the material and no more. There is not to be a surplus of electronic energy sufficient to set up harmful electrolytic reactions in the materials.

It has been known for some time that although hard water, if subjected to an electric force of sufficient magnitude, becomes subject to electrolysis and, if the force is decreased in amount there comes a time when no effect on the water occurs, there is a point between these two extremes at which some physical change occurs in the salts or other matter contained in the water, which change causes them to precipitate in the form of a sludge instead of a hard scale. The present invention includes as above stated, a similar regulation of the current, so that it is of a

strength only sufficient to bring about the desired physical changes, and insufficient to set up electrolysis.

Also, in my said earlier specification, an instance of the use of the invention was described as applied to the preparation of a vegetable extract known as "D. M." and used to prevent the formation of scale in boilers.

According to this invention there are other extracts from vegetable sources and some from animal sources which, alone or in combination or admixture, and when treated as above described (i.e. according to my earlier specification, but with the regulated potential and density of current) may be added to boiler feed water for the purpose of absorbing acidity, and/or

transforming the acids into harmless sugars, to prevent scale formation and corrosion.

It is also known that with a normal direct current, there is always a slight admixture of alternating current, due to the imperfections of the generator. The present invention may, according to these improvements, be carried out by the use of a standard D.C. current to which is applied means for arresting the D.C. whilst allowing the small amount of A.C. to pass through it.

Dated this 10th day of March, 1943.

For the Applicants,
WILSON, GUNN & ELLIS,
Manchester, 1.

COMPLETE SPECIFICATION

Improvements relating to the Treatment of Animal and Vegetable Materials

I, CHARLES REID, a British subject, of 3, Rose Garden Close, Canons Drive, Edgware, Middlesex, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the treatment of materials of vegetable and animal origin which are to be used subsequently in industrial, medical or dietetic processes, and has for its object the increasing of the available energy in those materials so that the final products from such subsequent processes are correspondingly more valuable. Some of the results aimed at by the treatments are (a) improving the power of the materials for chemical reaction with other materials, (b) preventing or retarding bacterial or other decomposition in the materials, and (c) increasing the physical strength of the final products, particularly with such materials as paper.

The invention is based upon a two-fold hypothesis namely that an atom in a vegetable or animal substance can and does function as a condenser or accumulator (that is, that the atom can be made to receive a charge of energy and to give up that charge, without losing its identity); and that the presence of an added charge in an atom, creates a stress or tension in the space between that atom and the nearest other atoms, or conversely that an increased stress or tension in the medium between any two atoms results in an increase of charge or potential in at least one of the atoms themselves. The charge

received by an atom may be either an addition to the normal or natural charge, or merely a replacement in whole or in part of a normal charge previously given up, or both. The hypothesis, applied to the treatment of the materials at a particular stage in a sequence of operations as set out below may be regarded as the principle of the invention. It is recognised, of course, that the conceptions of atoms as having nuclear and orbital constituents is an arbitrary attempt to visualise current atomic theories not capable of direct demonstration by observation and/or experiment, and that the reciprocal phenomena of receiving and giving up a charge of energy on the one hand, and increase or decrease of stress or tension in the inter-atomic space on the other hand, may be due to the gain and loss of orbital electrons in the atom, or to the displacement of electrons from one energy level or orbit to another, or may be due to some other sub-atomic disturbances not yet fully understood. I have found, however, as a matter of observable fact, that my invention does have the effect of increasing and prolonging the energy content of the animal and vegetable materials treated thereby and whether treated directly, or indirectly by addition to a pre-treatment carrier medium.

I have formed the belief that the capacity of the atoms of animal and vegetable materials to receive and give up a charge of energy with consequent variation of surrounding stresses is associated with what is popularly referred to as "life force." Certain it is, that materials com-

ing from a healthy life source have greater latent atomic energy for chemical reaction etc., than have those of the same kind coming from unhealthy life sources, and

5 that my invention is capable of improving those materials from unhealthy sources so that their energy index is at least on a par with that of the materials from healthy sources.

10 With regard to the increase of local electronic tension in the inter-atomic space, and its corresponding reaction of increasing the energy content of atoms, it may be stated that vitamins and enzymes

15 are found to be active (or at the least much more active) in the higher ranges of such tension, (their activity progressively decreasing as the tension decreases) whilst bacteria are active only in the lower ranges

20 of such tension (their activity increasing as the tension decreases). In so far as the present invention includes the impartation of greater energy to atoms or molecules, it has for one of its aims the elimination of any susceptibility of the materials

25 to bacterial action, and the providing of an aptitude for activation of vitamins, enzymes and the like agencies.

The industrial applications of the present invention will fall into two main groups, in one of which the materials will be treated so as to have their greater atomic energy used for merely physical purposes such as in preventing the

30 coagulation of sediment in boilers, or in facilitating the separation of materials in extraction processes; and in the other of which the materials will be treated so as to have their greater atomic energy used

35 to promote, or prolong, or accelerate chemical reaction. In a subsidiary group, applications of the invention to the manufacture of medicines, foods and beverages will be found, the materials in such cases

40 being treated so that, when in the living organism they will have a greater effect both in physical and in chemical reactions with the organism, because of the greater available energy imparted to them by the

45 process of this invention.

In the first of the said main groups of industrial applications, the invention, as is hereinafter set out more fully, may be applied *inter alia* to the preparation of

50 vegetable extracts already known as retarders of scale-formation in boilers and other hot-water apparatus, not only with the object of improving the extraction process in the manufacture of the prepara-

55 tions, but of prolonging the activating effect of the extracts when in the boiler water etc., and thus increasing the anti-scaling effect. In the second group, the invention may be applied to industrial

60 chemical processes which hitherto, in some

instances, appear to be frustrated or blocked for apparently unascertainable reasons. I have now deduced that such frustration is due to a premature expenditure of atomic energy in the materials

70 being reacted, and that the application of my invention, by increasing or replacing that energy, allows the partially-complete reactions to continue.

The present invention is involved in the preparation and uses of extracts from vegetable and animal sources, and comprises any method of preparation of those extracts which includes, in the order

75 stated, the steps of washing the original materials, bruising them (the term "bruising" including crushing, grinding and disintegration), subjecting them to an extraction process, and, during the extraction process, subjecting the mate-

80 rials to the influence of an electric field produced in an apparatus designed as a condenser with the material under extraction in contact with the respective charged surfaces of the condenser. The field is to be

85 one generated directly or indirectly by a continuous or a non-continuous current, i.e. a direct current (smooth or pulsating) or an alternating current (with or without rectification) and is to be of a strength

90 such as is found by experiment in each particular case not to produce acidity in the extracted materials, during the period of treatment or, if natural acidity is already present, not to increase acidity,

95 the presence or absence of acidity in each case being gauged by the pH test. This strength of current may be found by trial and error for any particular case.

As the potentials required to make the process effective are weak, and as, with a normal direct current such as is supplied in towns mains, there is usually a slight admixture of alternating current, due

100 *inter alia* to irregularities in the generators, the present invention may utilise such normal direct current of high voltage, with means applied for arresting the D.C. whilst allowing the small amount of A.C.

105 to pass, this being a convenient way of obtaining a low voltage A.C. The best results, however, are obtained from a smooth D.C. current of the required low voltage such as is produced by a low voltage battery or accumulator or from a

110 rectified A.C. current of low value.

The individual steps of the process are all known *per se*, including the electrical treatment which is set forth in my earlier Specification No. 543,706. Moreover, the

115 initial steps of washing and bruising perform only their normal functions and would no doubt precede any extraction process. Again, similar electrical treatments have been given to extracted

120

materials, such as fruit juices for example, after the extraction has been completed and in such a case the several steps would follow each other consecutively. It is an essential feature of the present invention that the electrical treatment is given during the extraction process, whether or not it continues after the completion of the extraction process.

10 The souring, putrefaction and decay of animal and vegetable materials is invariably accompanied by the formation of harmful acids. The chemical reactions involved in such phenomena as souring, 15 putrefaction and decay are due to natural tendencies to attain a zero equilibrium between the energy potentials of the several reagents concerned, and the progress toward such zero equilibrium may be gauged by a degree to which harmful acidity, or variation of acidity as denoted by the pH value is present. This phenomenon of approach to equilibrium is accompanied by an increase of insoluble content and a decrease in the Brownian movement. If the energy potentials arrive near to zero equilibrium, and have only slight difference between them, the ability to re-act with surrounding or added substances is correspondingly lowered not, 30 probably, because of the actual or approximate equilibrium *per se*, but because the higher potentials and corresponding tension in the inter-atomic medium have been brought down to lower levels thereby increasing the difficulty of energy units (e.g. electrons) passing from one atom to another. My invention is designed to prevent such lowering of the higher potentials, thereby maintaining, and in some cases increasing the ability of the materials to react with, or to impart energy to other substances with which they are brought into contact.

45 It is known that liquid substances extracted from materials of animal and vegetable origin deteriorate as time passes, some rapidly and others more slowly and such deterioration, at least in its earlier stages, is denoted by a loss of piquancy of taste, or aroma, or resistance to bacteria, and of nutriment value, together with a retrogression from a solvent phase, through a colloidal phase, to actual 55 deposit of the dispersed substance. I have ascertained that these deleterious changes, which represent an increased resistance to the passage of electrons from atom to atom, can be expressed in terms of a falling in the pH value of the liquids, and an increase in insoluble content, and that extracts obtained according to my invention, that is, whilst under the influence of the said field, both retain their original 65 pH value with corresponding ability to

maintain the tension in the medium and to pass electrons from atom to atom; and also retain their original proportion of soluble content, resulting in a greater resistance to deterioration accompanied by retention 70 of food value, than have extracts of the same kind not obtained according to my invention.

I have formed the conclusion that the keeping power, or lack of keeping power, 75 of vegetable, and animal materials, and the power to remain in solvent or colloid form without sedimentation and with the retention of food value is dependent upon the energy content of the atoms and the electronic tension in the medium between the atoms in those materials, this conclusion being supported by the fact that extracts from healthy materials have greater keeping power than those from unhealthy 85 materials. I am convinced also that the reason why extracts prepared according to my invention have the increased keeping power, as compared with extracts obtained by other means, is that by my invention 90 the atoms are charged with additional energy.

The application of the electric or electromagnetic field to the materials, whilst the extraction process is going on may, for 95 example, be according to my earlier invention disclosed in Specification No. 543,706, or may be according to any of those of the previous proposals therein referred to which are suitable, or may be according to that disclosed in Specification No. 487,595. 100

The extracts obtained may continue to be subjected to the influence of the field immediately after their extraction from 105 the original materials, either in the same vessel or in a separate vessel into which they may drain for that purpose.

The several stages of the process may include a sterilisation process, and this if 110 adopted will preferably be immediately before, or in the early stages of the extraction process, except in the case of fermented liquids or the like, when a sterilisation takes place after my process 115 has been completed.

According to a further feature of the invention, between the washing and bruising stages, the original materials may be passed through a complete or partial fermentation process, and in some cases the electrical treatment may be commenced during that process and contained uninterruptedly into the extraction process. 120

In one practical embodiment of the 125 invention already tried out, the electrical treatment is applied to the extraction of an anti-scaling compound for boilers and other hot-water apparatus. Such a compound is an extract from vegetable mate- 130

rials usually of the tannin series, but can be of any vegetable or animal extract having a capacity to act as an activator to enable the atomic energy content to be increased, and which when added to boiler water counteracts harmful acidity in the water and prevents the formation of scale; the salts etc. in the water being deposited as an energised sludge instead of as a non-activated incrustation. When the extract is first prepared the atoms of the material have sufficient surplus latent energy to impart energy to the atoms or molecules of the salts or other substances present in the water, in such a way as to set up (or, if already present to increase) repelling forces between them, thereby preventing coagulation and incrustation. When this compound is prepared by a process including my invention, the energy-content of the atoms is found to be increased, thus producing a capacity for a prolonged useful life of the compound when subsequently added to in the boiler, as well as increasing its intensity. Moreover, the unused compound, when prepared according to my invention, can be stored for a much longer time without bacterial action being set up. The stability of the tannin product may be measured by adding a substance such as potato juice which is subject to deterioration. If, for example, potato juice is added to the tannin product which has not been treated according to my invention, instability becomes apparent in 69 hours, and the chemical breakdown continues actively for another 24 hours. If now the same quantity of potato juice be added to the same quantity of the same tannin product which has been treated according to my invention, no instability becomes apparent at the end of 93 hours nor for a long period thereafter. Other vegetable extracts of a different chemical series may be utilised for the same purpose, and my invention is equally applicable to them.

In other practical embodiments of the invention, the treatment is applied to the extraction of essences, juices and the like for use as foods, or beverages, or for use as medicines.

A certain amount of work is being done at present on the dehydration of foods, mainly for the purpose of reducing transport costs for foods, and for prolonging the useful storage life of foods. Most of the methods attempted involve some kind of extraction process, but it is noticeable that the dehydrated foods, when prepared for consumption, have a certain "flatness" of taste, and a loss of distinctive aroma. It is my belief that the extraction processes used call for the expenditure of energy from the atoms in the foods, with

consequent loss of food value, and that the methods of preparation (cooking etc.) far from restoring that energy, call for the giving up of further sub-atomic energy and further loss of food value. This loss of energy is, in my opinion, the cause of said "flatness," loss of piquancy, and diminished nutrient value. In many cases, according to the hitherto known art, the product cannot be stored unless oxygen is extracted from the container and replaced with an insert gas such as nitrogen, probably due to the fact that the energy state and degree of inter-atomic tension has fallen into the region where bacterial action is possible.

According to a still further feature of my invention, the electrical treatment is applied in an extraction process (preceded by washing and bruising) which forms a part of a dehydration process. Food materials thus prepared, retain a large proportion of their original sub-atomic energy, and solubility and therefore in their final state approach more nearly in nutrient value to the natural unhydrated foods. Moreover, food substance thus prepared, according to this still further feature of the invention, may be subjected to a repetition of the electrical treatment during a re-hydration or cooking process (or both) when being prepared for use.

The following synopsis shows the general lines upon which the invention can be applied for dietetic, medicinal or industrial purposes:—

(a) The first stage comprises the washing of the vegetable or animal materials to remove superficial contamination, which can be done in a washing plant of any suitable known form.

(b) Next, the materials are bruised, cut and shredded, for example between stainless steel rollers and cutters, or in a pulping or shredding machine such as is used in the manufacture of wood pulp, and during this bruising process the materials may be heated (e.g. steamed) or otherwise treated in any known manner to retard oxidation and to facilitate the subsequent extraction process. The washing process ensures that all non-vegetable and non-animal matter is removed, whilst the bruising process results in a preliminary loosening of the inner structure of the materials, and in the exposure of a greater area to the effect of my process and of any applied reagents, including atmospheric reagents.

(c) In the third stage, which in some cases may be omitted, the bruised material is arranged in layers of say from 1" to 3" in thickness and is fermented. If, in the ultimate product, flavour and taste are to be of primary importance, the fermenta-

tion is prolonged; whereas if it is medicinal or food value or alcoholic properties in the ultimate product which are to be of first importance, the fermentation period

5 is shortened, or is omitted altogether. Alternatively a balance between taste and flavour on the one hand, and food value on the other hand, can be struck by suitably grading the period of fermentation.

10 (d) - Next, the bruised, or bruised and fermented materials, are subjected to a sterilising process, which also in some cases may be omitted, and are then passed to an extraction process. The sterilisation

15 may be effected by means of steam, and in such case the steam pressure may be utilised to transfer the materials to the extraction plant. During the extraction, the materials are agitated in the presence

20 of water and/or other liquid with or without heating and with or without a sub-atmospheric, or superatmospheric pressure, or alternating cycles of higher and lower pressures, and during this agitation the

25 whole mass is passed one or more times through an apparatus for example similar to that described and shown in my earlier Specification No. 543,706, or that set forth in Specification No. 487,595, or in a

30 similar or moving or stationary apparatus built as an integral part of the plant for the purpose of increasing the potential energy of the ultimate constituent structure of the material. The impartation to

35 the extractable material of an increased energy and/or the replacement of the energy lost in the phenomenon of separation by which the extraction goes on, results in a greater amount of extract

40 being obtainable than would be possible without such imparted energy, and also results in that extract which is obtained being of a better quality, capable of longer storage without corruption, and of more

45 potent reactivity than those extracts obtained without the use of my invention. It is found that with some substances of delicate structure such as grapes, mangoes and mangosteens, it is an improvement to

50 reduce the temperature of the materials, say to 40° F. or lower, during the agitation and energising process, but for other materials a temperature of 100—200° F. is ordinarily the best for good results. The

55 completion of the energising and extracting process is ascertained by test samples.

(e) When the extraction process is complete, the larger particles are removed by coarse filtering or straining, and the

60 remainder, in suspension, is passed to a colloid mill so that the non-liquid matter still remaining is reduced to a dispersion of colloid dimensions in the liquid phase. Preferably, the filtered material is passed

65 through an alternating or direct field on

its way to the colloid mill and for such purpose may pass for example through a second apparatus according to my Specification No. 543,706. Also the solid matter kept back by the filter or strainer will be

70 suitably pressed so as to yield as much liquid matter as possible, which liquid matter will be added to the filtrate. The coarse filtered material can be transformed into a flowable liquid form, re-

75 energized by my process and passed through the colloid mill for use in the preparation of a second grade product, or for addition to the original filtered liquid.

(f) The liquid material now obtained

80 is again subjected to my electronic energising treatment and is then passed to a concentrating and/or drying process. During concentration, which will mainly consist of the evaporation of water the

85 temperature should not exceed 212° F., and should preferably lie between 150 and 200° F. After concentration, and before drying (if drying is resorted to) the concentrate is subjected to the electrical

90 treatment, e.g. in an apparatus according to my earlier Specification No. 543,706. Drying may be carried out on heated drums in known manner, with or without subsequent grinding to produce a powdered

95 product.

Alternatively, the energised extract, whether having been passed to a colloid mill or not, as required and having been subjected to the subsequent electronic

100 treatment referred to above, is thereupon converted to a powder immediately by being discharged as a fine spray into a heated atmosphere within a closed chamber. Drying then takes place instan-

105 taneously without loss of atomic energy by fermentation and for oxidation.

In either case, the resulting powder may be toasted to give it an added flavour, and it may be moisture-conditioned, prefer-

110 ably to give it a moisture content of between 3% and 7% by weight. The powders are now stored for a period with the minimum access of oxygen, say by being kept in air-evacuated containers, or in the

115 presence of an inert gas such as nitrogen, or by being packed tightly together in cylinders. During this stage and within a period of 2 or 3 months, the full natural flavour and aroma are produced through

120 the agency of a slow post fermentation.

A powdered product obtained from potatoes by the above method could be made into starch; a product from beets could be used for sweetening purposes;

125 and a product from grapes could be used in the manufacture of wines at a place remote from the vineyards.

In a particular example carried out according to the above scheme, a juice

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obtained from a portion of a red cabbage, according to my invention, was, at intervals thereafter, compared with an extract obtained by ordinary means from another portion of the same cabbage. The comparisons were made by using the B.D.H. pH indicator, which is a colour comparison, and the results may be tabulated as follows, the "treated" specimen being that prepared according to my invention and the "untreated" being that obtained without the use of my invention:—

	Test Hours	pH value treated specimen	pH value untreated specimen
15	0	8.5	8.5
	16	8.5	8.5
	38.5	8.5	8.5
20	62.5	8.5	8.0
	75	8.5	7.0
	86.5	8.5	6.7
	99	8.0	6.5

In another example, also according to the above scheme, shredded turnip (the turnips having previously been washed) was placed in an enamel pan with water and brought to a temperature of 150° F., after which the shredded turnip was subjected to a repeated compressing operation to extract the soluble matter. During and after the compressing operations the material was subjected to an electrical charge such as obtains with an apparatus according to my Specification No. 543,706, and the process was repeated with a fresh supply of turnip each time, but with different strengths of electronic tension, and the results may be tabulated as follows:—

	Tension in Milli-volts	First signs of instability After 20 hrs.	Gasification began After 56 hrs.	Coagulation completed After 104 hrs.	Gasification ended After 128 hrs.
	2				
	3	" 56 "	" 56 "	" 128 "	" 128 "
45	4	" 80 "	" 80 "	" 128 "	" 128 "
	5	" 80 "	" 80 "	" 128 "	" 152 "
	6	" 80 "	" 80 "	" 152 "	" 176 "
	7	" 80 "	" 80 "	" 152 "	" 176 "
	8	" 56 "	" 70 "	" 152 "	" 176 "
60	9	" 56 "	" 56 "	" 128 "	" 152 "
	10	" 20 "	" 56 "	" 104 "	" 128 "

An example of the electrical apparatus employed may be substantially according to Fig. 2 of my said prior Specification No. 543,706, using a 50-cycle, single phase A.C. from 2 to 10 milli-volts tension, and passing 250—500 microamps. The rate of flow of the material over the plates would be $\frac{1}{2}$ gallon per minute or thereabouts, and the area of plate in contact with the material 75 square inches. The plates of the condenser could be arranged as stirrers and agitators in the liquid, and care taken to avoid their contacting each other, or some other method of agitation could be adopted. In the application of the invention to paper the electrical treatment would take place during digestion of the pulp to extract the cellulose.

The advantages accruing from the adoption of this invention are many. In particular it may be stated that: (a) activated protective films can be formed on the inner face of boilers etc. to prolong the activity of those installations, as well as reducing running costs; (b) food products in vitalised powder form may be transported to any part of the world without risk of climatic interference, and without loss of taste, aroma and nutrient or medicinal value; and (c) the long storage life of the treated products makes possible a more practical control of economic factors such as supply and demand, as well as permitting a more efficient preparation against rational shortages due to emergencies.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A process for the treatment of animal

- and vegetable materials for the purposes set forth, which includes, in the order stated, the steps of washing the original materials, bruising them (the term
- 5 "bruising" including crushing, grinding and disintegration), subjecting them to an extraction process, and, during the extraction process, subjecting the materials to the influence of an electric field
- 10 (as herein defined) produced in an apparatus designed as a condenser with the material under extraction in contact with the respective charged surfaces of the condenser.
- 15 2. A process according to Claim 1, wherein the electronic treatment is derived from a source of not more than 10 millivolts tension.
3. A process according to Claims 1 or
- 20 2 wherein the electric or electro-magnetic charge is applied to the materials by the use of an apparatus according to my earlier Specification No. 543,706.
4. A process according to Claims 1 or
- 25 2, wherein the electric or electro-magnetic charge is applied to the materials by the use of an apparatus according to the earlier Specification No. 487,595.
5. A process according to Claims 1, 2,
- 30 3 or 4, wherein between the washing and bruising stages, the original materials are

passed through a complete or partial fermentation process.

6. A process according to Claim 5, wherein the electrical treatment is commenced during the fermentation process and is carried on into the extraction process without interruption.

7. A process according to any of the preceding claims, applied to the preparation of an anti-scaling compound for boilers.

8. A process according to any of Claims 1 to 6, in which the extraction stage forms a part of a dehydration process.

9. A process according to Claim 9, wherein the rehydration or cooking of the materials includes a repetition of the electrical treatment.

10. A process according to Claim 1, when carried out according to the synopsis herein set forth.

11. Vegetable and animal materials whenever prepared or produced according to a process herein particularly described and ascertained.

Dated this 21st day of July, 1943.

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